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ABSTRACT

Elementary school attendance and achievement data were collected from the records of a random sample of 1,200 Chicago students. There were complete longitudinal data sets for 333 students in kindergarten through eighth grade. Student absence was highest in kindergarten and decreased until fourth grade; absence rates were approximately constant from fifth to seventh grades and increased again in eighth grade. The linear and quadratic trends of the absence curve are statistically significant. Girls were absent more than boys, but the differences are not significant. There are significant correlations between absence and student grades, but not between absence and standardized test scores. (Author)

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A Longitudinal Record of Elementary School Absence and Achievement

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In the past decade educational researchers have been studying and writing about school attendance and other measures of quantity of schooling. Much of this attention is due to Carroll's (1963) model of school learning in which degree of school learning is postulated to be a function of the amount of time actually spent in learning, and the time needed to learn. Recent work has been focused on student academic engaged time in the classroom (for example, Rosenshine and Berliner, 1978) and, in other work, grosser measures of quantity of schooling have been examined (for example, Wiley and Harnischfeger, 1974). In general, researchers believe that school attendance and student time on task are both significantly related to measures of student outcome (Porwoll, 1977) and deserve careful scrutiny.

Rates of student absence from school, the focus of this study, change from one year in school to another, as absence depends less on childhood illness and more on child choice. In order to produce year-to-year absence norms for boys and girls, Stennet (1967) collected attendance data from a group of junior and senior high school students in a rural school district during the 1964-65 school year. He studied the entire attendance histories of the students, and plotted their absence rates from kindergarten through the twelfth grade. The data were mixed longitudinal and cross-sectional, so that in his plot, absence data in one grade contained some different students from absence data for another grade. Stennet's data portrayed boys attending schools more often than girls, and a pattern of absence that declined from kindergarten to the fourth grade, remained constant between fourth and sixth grade, decreased at seventh, was stable from eighth to tenth, and increased at grade twelve.

In the current study, we also collected attendance histories (up to the eighth grade) of a sample of high school students. We applied statistical analyses to the data in order to discover if there were significant differences between boys and girls, and if there were differences among four classes of students, each from a different elementary graduation class. The year of graduation effect was tested to find out whether absence patterns changed from one class of student to another. The result of the multivariate statistical analysis was also used to describe the shape of the absence curve with polynomial terms.

In addition to a thorough and accurate description of absence rate in each elementary grade for boys and girls, we have attempted to discover the effects of these absence rates on school achievement. Students' reading grades (those assigned by teachers and standardized test scores) were analyzed with regression techniques. The attendance portion of this research is referred to in the following pages as Study I, and the achievement study as Study II.

STUDY I

METHOD

Sample and Data Collection

We chose a random sample of 1,200 students who were enrolled in Chicago public high schools in the fall of 1979. This list of students was taken from the citywide student masterfile. Fifteen names were eliminated from the list because the students were enrolled in special, alternate schools. The remaining 1,185 students were enrolled in 63 different regular high schools, high school branches, or vocational high schools in Chicago.

The researchers[1] visited all of these high schools seeking the elementary school records in the students' permanent files. The records contain attendance and enrollment data, as well as grades, test scores, and personal data. We could not obtain records for all 1,185 students in the sample because many had either dropped-out or changed schools, or their folders were inaccessible because of transfer from one site to another. There were 617 student folders that were located and contained attendance data for at least three years of enrollment in Chicago public schools. From these 617 folders we transcribed attendance, enrollment and other data onto coding sheets.

Variables

The independent variables in Study I are sex and year of elementary school graduation. There are four values of year of elementary school graduation, 1976, 1977, 1978, and 1979, corresponding to the elementary graduation dates of the students who were seniors, juniors, sophomores, and freshmen. The two independent variables created a 2 x 4 factorial design.

The dependent variables in Study I are <u>average number of days absent per week of enrollment</u> for each of the nine years of elementary school (kindergarten through eighth grade). The nine dependent variables were computed by dividing the number of days absent each year by the appropriate numbers of weeks of enrollment for that child for that year. (Not all children were enrolled for the full school year, and the length of the school year has changed from 40 weeks to 36 weeks.)

RESULTS

The mean numbers of days absent per week for students in kindergarten through eighth grade are presented in Table 1. The table also contains standard deviations and numbers of students. This table indicates that

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[1]The authors gratefully acknowledge the assistance of Kate Asselin, Linda Hill, and Elois Washington in this phase of the study.

TABLE 1

AVERAGE NUMBER OF DAYS ABSENT PER WEEK FOR ENTIRE SAMPLE AND FOR LONGITUDINAL SAMPLF WITH WITHIN GROUP CORRELATIONS

		Year in School								
		K	1	2	3	4	5	6	7	8
Entire Sample	Mean	.567	.426	.326	.317	.293	.301	.299	.297	.317
	S.D.	.580	.495	.341	.332	.346	.288	.368	.299	.395
	n	426	461	468	476	492	508	516	537	532
Longitudinal Sample	Mean	.567	.405	.308	.300	.288	.287	.308	.296	.327
	S.D.	.605	.495	.327	.301	.366	.271	.408	.299	.432
	n	333	333	333	333	333	333	333	333	333
	K	1.00								
	1	.37	1.00							
	2	.49	.37	1.00						
	3	.45	.42	.56	1.00					
	4	.27	.23	.32	.45	1.00				
	5	.30	.29	.40	.48	.38	1.00			
	6	.33	.28	.35	.35	.25	.40	1.00		
	7	.35	.23	.33	.42	.29	.47	.41	1.00	
	8	.18	.18	.29	.30	.21	.29	.27	.41	1.00
		n=333								

student absenteeism is highest in kindergarten and that it decreases monotonically until fourth grade. Absenteeism is then approximately constant from fifth through seventh grade, and there is a slight rise in absenteeism at the eighth grade. These results are similar to those presented by Stenett (1967). Where differences in increases or decreases do occur, they may be due to the differences in school organization. The school system that Stenett studied had junior high schools, whereas the Chicago schools are organized with K-8 elementary schools, and high schools.

In Table 1 there are two sets of statistics for absenteeism. The first set of means and standard deviations was computed from the 617 students who were enrolled in elementary schools for three years or more. The second set contains 333 students who were enrolled in Chicago public schools for all nine of these years. Both sets show the same patterns of absence, but there is generally less absence in the smaller set because this is a relatively select and stable group of students. We are not so much interested in the absolute absence norms as we are in the pattern of absence development.

Table 1 also contains the intercorrelations among yearly absence rates of the 333 students. There is relative stability in these absence rates, with the correlations between absence in one year and absence in the preceding year ranging from .37 to .56. Absence rates separated by two years range from .25 to .49. Those separated by three years range from .23 to .45. In the entire matrix, the lowest correlation is between absence rate in kindergarten and absence rate in eighth grade (.18). This is consistent with all expectations.

Sex and year of elementary school graduation, the two independent variables, are used in Table 2 to break down the absence data. Absence rates, standard deviations, and n's are given for each cell, and for the aggregates. As in Stennett's findings, we see that girls are absent consistently more

TABLE 2

AVERAGE NUMBER OF DAYS ABSENT PER WEEK BY SEX AND YEAR OF GRADUATION FOR LONGITUDINAL SAMPLE

Year Grad	Sex	N		Year in School								
				K	1	2	3	4	5	6	7	8
76	M	29	$\bar{X}$	.450	.369	.276	.267	.195	.229	.286	.345	.216
			SD	.428	.423	.292	.307	.142	.333	.336	.361	.243
76	F	39	$\bar{X}$	.562	.354	.317	.247	.342	.288	.317	.288	.169
			SD	.733	.415	.343	.236	.760	.281	.441	.308	.163
77	M	48	$\bar{X}$	.460	.413	.257	.332	.287	.286	.294	.294	.330
			SD	.368	.431	.231	.348	.327	.283	.332	.360	.399
77	F	46	$\bar{X}$	.653	.488	.389	.340	.315	.323	.331	.302	.355
			SD	.741	.439	.472	.419	.320	.261	.466	.346	.382
78	M	52	$\bar{X}$	.626	.353	.252	.271	.289	.298	.357	.291	.374
			SD	.563	.280	.195	.271	.228	.227	.608	.220	.366
78	F	47	$\bar{X}$	.674	.483	.341	.304	.271	.314	.296	.337	.400
			SD	.754	.679	.373	.257	.244	.241	.278	.325	.494
79	M	38	$\bar{X}$	.497	.318	.334	.295	.275	.255	.351	.247	.301
			SD	.533	.306	.339	.247	.257	.222	.395	.200	.300
79	F	34	$\bar{X}$	.545	.437	.298	.336	.303	.271	.214	.264	.411
			SD	.543	.825	.287	.269	.341	.354	.195	.231	.812
76	M&F	68	$\bar{X}$	.514	.361	.300	.254	.280	.263	.304	.313	.189
			SD	.620	.414	.321	.266	.584	.304	.397	.380	.201
77	M&F	94	$\bar{X}$	.554	.450	.322	.336	.301	.304	.312	.298	.343
			SD	.586	.434	.373	.382	.325	.272	.401	.351	.389
78	M&F	99	$\bar{X}$	.689	.415	.294	.287	.280	.306	.322	.313	.387
			SD	.658	.511	.295	.264	.235	.233	.479	.275	.431
79	M&F	72	$\bar{X}$	.520	.374	.317	.315	.289	.262	.286	.255	.353
			SD	.534	.607	.314	.257	.298	.290	.322	.214	.597
All	M	167	$\bar{X}$	.519	.365	.276	.293	.269	.273	.322	.291	.318
			SD	.485	.359	.261	.295	.256	.262	.446	.289	.346
All	F	166	$\bar{X}$	.615	.445	.340	.307	.307	.302	.294	.301	.336
			SD	.703	.600	.380	.308	.450	.280	.367	.309	.506

often than boys. The mean statistics do not show an apparent difference among the four classes of students. Absence rates for boys and girls and for the four classes are plotted in Figures 1 and 2.

The data were analyzed in a multivariate design of two factors (sex and year of graduation) and nine correlated dependent variables (Finn and Mattson, 1978). This approach to the data analysis was chosen in preference to a design with three independent variables and repeated measures because we do not have homogeneous variances in the absence data from year to year, nor are the correlations among the absence rates homogeneous. A matrix of orthogonal polynomial weights was used to transform the dependent variables in order to test the precise order of the absence curve. The design permitted us to test whether boys and girls differed, whether the four classes (years of graduation) were different, and whether these two factors interacted, in addition to testing the trend of the overall absence curve.

Table 3 is the F-table for these analyses. In the column marked Total Absence are the univariate F ratios for the independent variables sex and year of graduation, and the interaction between the two variables. The single dependent variable is total absence for the nine years of school. The interaction and the main effects are not statistically significant, although as the mean scores show, and as Figure 1 shows, girls have higher absence rates than boys in all years but one. The multivariate analysis is shown in the columns under "Step down tests." The test of the constant effect is the test for trend, and it shows a significant ($p < .01$) quadratic and linear trend. The step down tests for sex and year of graduation are actually tests of the interaction between sex and grade and year of graduation and grade, and the sex by year of graduation hypothesis is a test of triple interaction. None of these is significant.

FIGURE 1

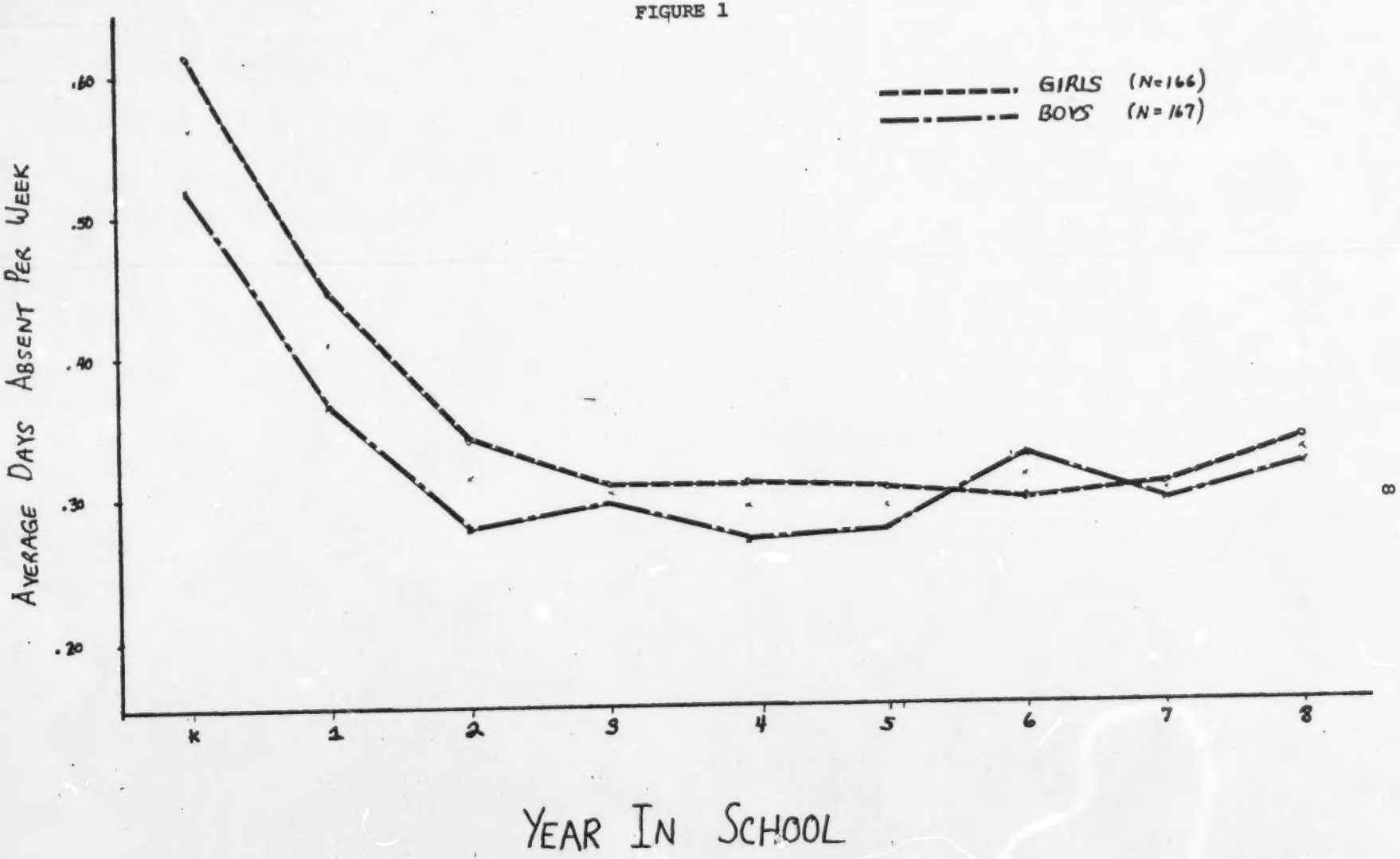
GIRLS (N=166)
BOYS (N=167)
AVERAGE DAYS ABSENT PER WEEK
.60
.50
.40
.30
.20
K
1
2
3
4
5
6
7
8
YEAR IN SCHOOL

FIGURE 2

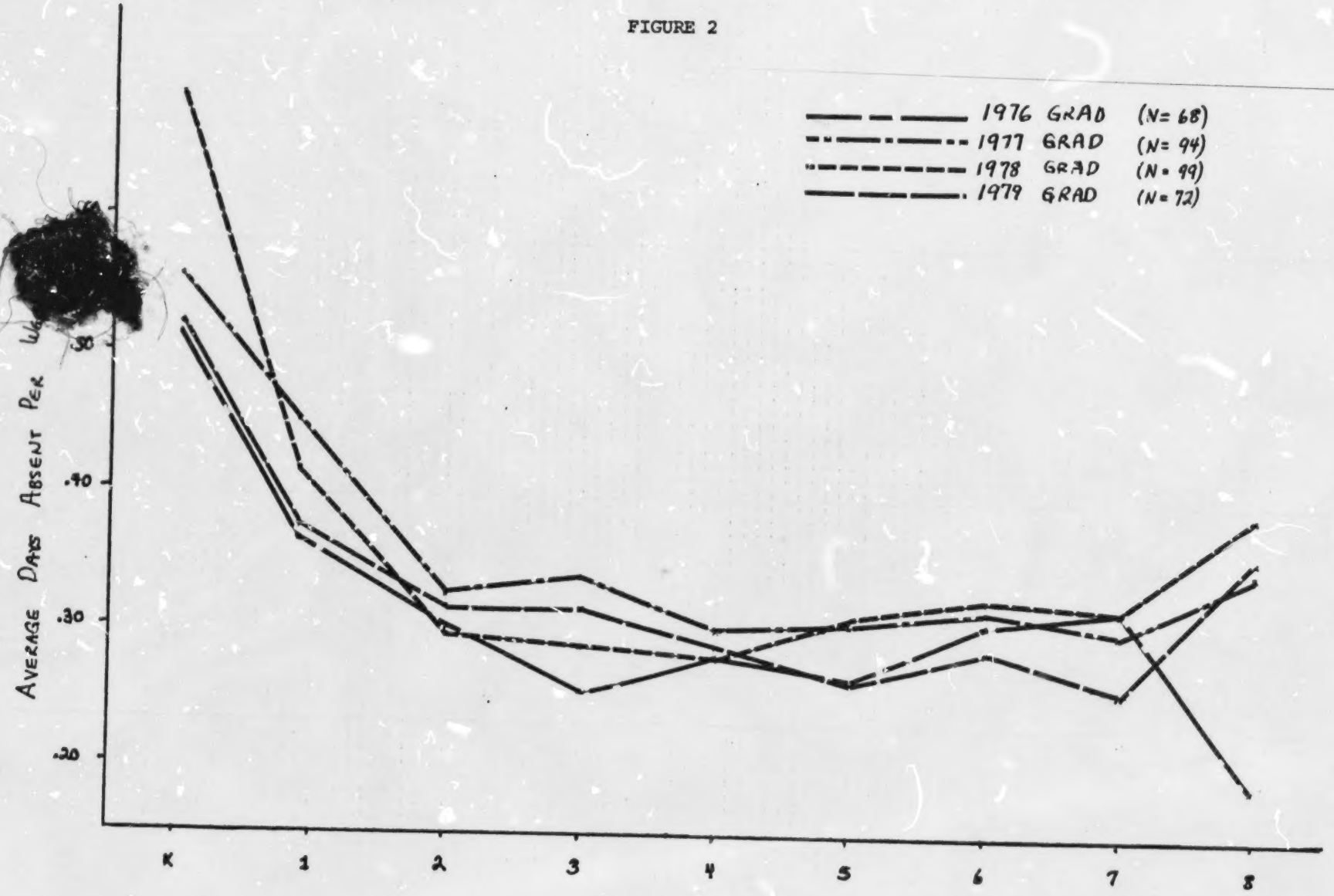
1976 GRAD (N= 68)
1977 GRAD (N= 94)
1978 GRAD (N= 99)
1979 GRAD (N= 72)
AVERAGE DAYS ABSENT PER
.40
.30
.20
K
1
2
3
4
5
6
7
8
YEAR IN SCHOOL

TABLE 3

MULTIVARIATE ANALYSIS OF VARIANCE FOR LONGITUDINAL SCHOOL ABSENCE DATA

Source of Variation	df	Total Absence	Step down tests				
			Linear	Quadratic[a]	Cubic[a]	Quartic[a]	Quintic[a]
CONSTANT	1	-	43.03*	42.07*	2.83	0.72	4.27
SEX[a]	1	1.69	3.06	0.25	0.85	0.14	0.12
YEAR OF GRADUATION[a]	3	0.87	0.06	2.78	1.88	1.11	0.45
SEX by YEAR OF GRADUATION[a]	3	0.09	0.15	0.62	1.04	1.03	0.71
WITHIN GROUP MEAN SQUARE	325	0.56	0.22	0.15	0.13	0.10	0.09
TOTAL	333						

[a]The previous effects are eliminated

*$p < .01$

This portion of the study has demonstrated the development of student absence rates in nine years of elementary school. In general, the previous work of Stennett (1967) is supported with longitudinal data. The absence rates of four different cohorts of students did not differ. Although this sample of Chicago students may not be representative of all urban youth currently in school, we believe that we have demonstrated stability in the pattern of school absence.

STUDY II

A Preliminary Analysis of Absence Rates and Achievement

This portion of the study uses the same data base reported in the previous pages. In addition to the absence rates, two indices of reading achievement are used. We collected the reading grades that had been assigned by classroom teachers each year, and the grade equivalent scores from the comprehension subtest of the Iowa Test of Basic Skills.

Table 4 gives the correlation between student absence and reading grades over the elementary school years. The correlations are based on the subset of the longitudinal sample that had no missing reading grades (317 students out of 333). In general the correlations are not very large. The largest coefficient in the table ($r = .22$) is between reading grades and absence in grade 8.

The next step in this preliminary analysis was to conduct a series of stepwise regressions. In the first set we used teacher grade for each year in school as the dependent variable and absence (including absence in the year that corresponded to the year of the teach reading grade) as the independent variables. For example, grade 3 reading was regressed on the absence rates for grade 3, grade 2, grade 1, and kindergarten. In the second

TABLE 4

CORRELATIONS OF STUDENT ABSENCE WITH TEACHER ASSIGNED READING GRADES

Absence	Reading Grades 1	2	3	4	5	6	7	8
K	-.19*	-.14*	-.10	-.14*	-.04	-.13*	-.11	-.12
1	-.12	-.06	-.05	-.09	-.03	-.07	-.14*	-.12
2		-.20*	-.13*	-.11	-.10	-.13*	-.15*	-.16*
3			-.17*	-.18*	-.19*	-.11	-.17*	-.21*
4				-.05	-.04	-.00	-.04	-.05
5					-.05	-.17*	-.10	-.12
6						-.12	-.09	-.02
7							-.14*	-.14*
8	N=317							-.22*

*$p < .05$

set of regressions, sex of student and the number of times that the student transferred from one elementary school to another (a rough SES index) were used as control variables before the absence effect was tested. Finally, we examined whether or not absence was related to reading grades after controlling for the reading grade of the previous year, as well as sex and number of school transfers. For all of the stepwise analyses, new variables were allowed to enter into the regression equation only if the change in R^2 met or exceeded one percent of the variance.

Table 5 gives the summary for these stepwise regression analyses. For grade 8 reading scores, grade 8 absence rates, and grade 3 absence rates were significant. After controlling for sex and number of transfers, the two absence rates were still significant. For grade 7 reading scores, the absence rate of grade 3 emerged as important again. Grade 3 absence rate was significant after controlling for grade 6 reading grades. For grade 6 reading grades, fifth grade absence rates were statistically significant. It remained significant after controlling for sex and number of transfers, and also after controlling for grade 5 reading grades. For reading grades in third, fourth and fifth grades, grade 3 absence rates had statistically significant effects. These effects were significant in these three grades after controlling for sex and number of transfers, but were <u>not</u> significant after controlling for the previous year's grade. For second grade reading achievement, grade 3 absence rate had a significant effect. This effect was significant after controlling for sex and number of transfers. In general, the relationships between reading grades and absence rates is not very strong. The R^2 values are very small. The largest R^2 was .068 for absence rate and reading achievement in grade 8. However, in looking at a select group of students, we have found significant predictions of grades even after controlling for the strong association of previous grades.

TABLE 5

STANDARDIZED REGRESSION COEFFICIENTS FOR
TEACHER ASSIGNED READING GRADES

Dependent Variables Reading Grades in	Std. Regr. Coef. of Control Variables Sex	Trans.	Prev. Ach.	Std. Regr. Coef. of Independent Variables		R	R^2
Regression 1							
1				Ab K	-.187*	.187	.035
2				Ab 2	-.204*	.204	.042
3				Ab 3	-.172*	.172	.029
4				Ab 3	-.176*	.176	.031
5				Ab 3	-.194*	.195	.038
6				Ab 5	-.172*	.173	.030
7				Ab 3	-.171*	.171	.029
8				Ab 8,	-.169*	.261	.068
				Ab 3	-.150*		
Regression 2							
1	.128*	-.174*		Ab K	-.161*	287	.082
2	.118*	-.091		Ab 2	-.188*	.254	.064
3	.105*	-.102		Ab 3	-.144*	.225	.051
4	.088*	-.042		Ab 3	-.167*	.201	.040
5	.133*	-.061		Ab 3	-.180*	.244	.060
6	.059	-.142*		Ab 5	-.137*	.230	.053
7	.076	-.058		Ab 3	-.156*	.196	.038
8	.088	.066		Ab 8,	-.174*	-	-
				Ab 3	-.154*	.276	.076
Regression 3							
1	-	-	-		-	-	-
2	.056	-.002	.513*	Ab 2	-.114*	.554	.307
3	.039	-.058	.528*	Ab 3	-.020	.604	.365
4	.043	.017	.488*	Ab 3	-.072	.522	.273
5	.029	-.040	.497*	Ab 3	-.098	.544	.296
6	-.002	-.089	.486*	Ab 5	-.126*	.531	.282
7	.051	.014	.451*	Ab 3	-.128*	.484	.234
8	.054	.024	.428*	Ab 8	-.139*	.498	.248

*$p < .05$

Table 6 gives the correlation between absence and standardized reading scores. The subjects represented in this table are a further subset of the longitudinal sample. These subjects had complete standardized test scores for grades four to eight. None of the correlations is significant except for the correlations in grades 7 and 8. A series of stepwise regression analyses are used to analyze these significant correlations. The regressions are shown in Table 7. The grade 7 absence rate had a significant effect on grade 8 standardized reading scores. This effect was still significant after controlling for sex, number of transfers, and for previous achievement scores. Grade 7 absence rate also had a statistically significant effect on grade 7 standardized reading scores. This effect was significant after controlling for the same three variables.

In general, absence rate is significantly but not highly associated with reading achievement. Part of the reason for this finding may be due to the observation that reading is primarily learned in the home and not in school. Another explanation is that our index of quantity of schooling is too crude to detect subtle variation in more important time variables, such as time-on-task. The selective nature of the sample may have influenced the results as well. Other environmental and school variables need to be examined in relationship to absence and reading achievement, before any conclusions can be drawn.

TABLE 6

CORRELATIONS OF STUDENT ABSENCE WITH STANDARDIZED READING TEST SCORES

Absence	Reading Scores (GE)				
	4	5	6	7	8
K	-.14	-.13	-.11	-.11	-.08
1	.03	..05	.04	.06	.02
2	-.12	-.11	-.12	-.13	-.11
3	-.06	-.08	-.08	-.08	-.10
4	-.03	-.01	-.06	-.08	-.10
5		-.01	-.04	-.07	-.13
6			.12	.05	.04
7				-.22*	-.27*
8					-.16*
N=151					

*$p < .05$

TABLE 7

STANDARDIZED REGRESSGION COEFFICIENTS FOR
READING ACHIEVEMENT TEST SCORES

Dependent Variable: Test score in	Std. Regr. Coef. of Control Variables Sex	Trans.	Prev. Ach.	Std. Regr. Coef. of Independent Variables		R	R^2
Regression 1							
Grade 7				Ab 7	-.217*	.217	.047
Grade 8				Ab 7	-.266*	.266	.071
Regression 2							
Grade 7	-.203*	-.106		Ab 7	-.222*	.313	.098
Grade 8	-.181*	-.164*		Ab 7	-.263*	.358	.128
Regression 3							
Grade 7	-.088*	.026*	.877*	Ab 7	-.072*	.902	.813
Grade 8	-.001	-.070*	.883*	Ab 7	-.066*	.912	.831

*$p < .05$

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